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ORIGINAL ARTICLES.

THE VALUE OF WEAK CYLINDERS FOR THE RELIEF OF EYE MUSCLE STRAIN.

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Three years ago I read a paper before the ophthalmological section of the American Medical Association on the value of 0.25 D. cylinder in the correction of the lesser grades of astigmatism. My additional experience confirms the position which I then took.

The annoyance occasioned by eye strain demands recognition from complaining patients whose heads will ache when the eyes are much used. All astigmatic eyes do not suffer in like proportion. There are three factors at work that bring about annoyance. The first is the amount of eye work required by a badly shaped cornea; a second factor is the degree of fault; and a third is found in the nervous susceptibility of the patient.

As to the first condition, the amount of work required, the majority of astigmatic eyes only exhibit the trouble under forced application. Eyes which have done faithful and painless duty for many years are suddenly called upon for an unusual effort. They break down with pain, which then returns upon moderate use with a persistency that makes eye work unsatisfactory, and the individual miserable. The defect had always existed, and would not have been brought out had the additional labor not been undertaken. This is constantly illustrated in overworked advanced school children at examination periods. They complain of painful eyes and head from the too close application when their parents, who exhibit the same degree of irregular refraction, have never suffered. This complaint is especially made if the young patient is of the nervous type, is rapidly growing, and is more anxious to secure good school grades than to take open air exercise. Hence girls suffer more than boys.

Physicians are seldom consulted by healthy people who have no physical complaints; and likewise ophthalmic surgeons only see those whose eyes are not comfortable. Such eyes are not necessarily inflamed; nor is there always dull vision. Most frequently the eyes themselves look in every way well, but with the inability to use them with comfort. The majority of those who consult me for painful eyes and head see clearly, and so state promptly: "It is not that my eyes are not sharp seeing, for I can see any small object that any one else can see, but they are not comfortable under use and my head aches when I read." These two facts are daily noticed. So constantly are they complained of that rarely do I not find irregular refraction when these symptoms are present, headache being the chief. My experience enables me to formulate, at least for my own guidance, this axiom: *Headache under eye use with acute vision in by far the majority of cases means astigmatism, and usually of low degree.* If the irregularity of the cornea is not detected, it is because it has not been carefully sought for. It also means that the headache under eye use will not be relieved by any medication or course of treat-

ment until this irregularity of refraction is found and corrected.

Many specialists act upon the belief that V=$^{20}/_{XX}$ is incompatible with annoying irregular curvatures in the cornea, and that it is needless to seek for astigmatism in such eyes. In cases of eye pains with acute vision their attention is therefore diverted from the true cause of the eye trouble to the examination for irregular action in the socket eye muscles, of which there is endless variety both in eyes that give no trouble and eyes that are painful. I find V=$^{20}/_{XX}$ in one-third of my astigmatic cases; and this good vision among my most suffering patients. The most marked relief and the most brilliant results from the adjustment of cylinder glasses I obtained among this class. Many of them had been under treatment by specialists and were wearing + spherical lenses for near work but with no comfort. These cases are often mistaken for accommodative faults formerly known as muscular asthenopia, and for which 1 + D. was the best known remedy. In former years I prescribed such glasses fifty times where I now have occasion to prescribe them once.

I often wonder what has become of the hosts of hyperopic eyes that I formerly saw and treated with spherical convex lenses. That I see the same character of eyes now I am quite sure, but no longer from the same standpoint. A more careful examination proves these cases to have been mild grades of astigmatism, often myopic. The same class still come to me from other specialists who are holding the views that I formerly acted upon, before I found out my mistake.

Years back I became aware that the most annoying irregularities of the cornea are the slight deviations which are still compatible with sharp vision, V=$^{20}/_{XX}$ or $^{20}/_{XXX}$, seldom less than $^{20}/_{XL}$, and frequently the greater fault in one eye only. In my most ailing patients I so constantly find the lesser irregularities that I have been forced to the conclusion that in the high degrees of astigmatism the eye ceases to make the effort for acute vision, recognizing its inability, and hence the less muscular strain and consequently less headache. In the small irregularities of corneal curvature headache on eye use is the

most constant and conspicuous symptom. It is more common than eye ache although the two usually go together. When patients with refractive errors consult me complaining of defective sight and no pain in the head, as a rule astigmatism is either excessive or I find none of it. I accept as a most valuable aid in the search after astigmatism persistent headache on eye use. As I have previously said the reading of Jæger No. 1, with $V=^{20}/_{XX}$ by such patients to me no evidence that a painful degree of astigmatism does not exist. With this acute vision patients with over-strained eye muscles often cannot read with comfort ten minutes, day-light even annoys, and fixation for a short time, as looking into the face of a friend while conversing or into the plate while eating, excites nausea.

In the casual examination of these patients, some of them at first see no difference in the tinting of the lines on the clock dial chart. They will repeatedly say "I see no difference whatever in the color. To me they are all alike." This would look as if there was no astigmatism. After these repeated trials and assurances, most examiners would abandon the idea of irregular refraction. But I say to myself "here is a case of headache on eye use for near work. This patient feeling well can soon read himself into a headache. In my experience a low degree of astigmatism is by far the most painful source of this discomfort. I will continue my search until I feel assured that it does not exist." By perseverence in the examination of one eye at a time I will eventually get out of the patient that all the clock dial lines are not exactly of the same tint. Some will now have a slight grayish, bluish or brownish tint, which was not perceptible at the first scrutinizing of the card. Once they detect the difference they never afterward lose it. Some lines now are not as clean black as other lines, and a weak cylinder will clear all up better than the duplicate number of a weak spherical lens. Some patients will persist in the statement that there is a uniformity in color for all the lines until homatropia is used, when the slight difference which is the cause of all the eye trouble is discovered. The adjustment and wearing of proper cylinders, c.25 c. + or — will

promptly put an end to the eye and head discomforts which had been the torment of the patient for months or even years.

In my case book hundreds of such patients have been entered, persistent headache on eye use, the constant complaint, a low degree of astigmatism always found, a 0.25 D. cylinder prescribed with the result of treatment recorded at varying periods, days, weeks or months after the glasses had been given. "No headache since I have worn the glasses except on the occasion when I tried to read without them." By the wearing of these weak cylinders of 0.25 D. in a number of cases patients have suddenly jumped up from ten minutes' reading with pain to many hours' continuous reading without any head discomfort whatever.

I will give but one illustration from among this very numerous class of recorded cases because on account of her professional history it was of more than usual interest. The young lady was from New York City, æt. 16, and well developed. She had been under more or less constant treatment on account of eye discomforts for five years, and had been removed from school because she could not study without pain in the head. When the first consulted ophthalmic surgeon who had had her case under observation had exhausted all theories and treatment with no relief, and had finally found weak recti muscles for which he advised tenotomy, the father refused to have an operation performed. The young lady after an interval and still suffering was put under the care of a second specialist. Guided by the experience of the first as related by herself, he sought diligently to procure her relief. One by one all remedies were tried. Spherical lenses, practicing with prisms, internal medication, rest, but all with no benefit. When he had exhausted his resources he also suggested muscle cutting as the only untried remedy. He thought that relief would come surely through this surgical treatment. The father again declined to permit any operation. In the course of time this healthy looking girl, under blue glasses, was brought to my office for treatment. Her vision was $^{20}/_{XX}$ and for one or two minutes she could read No. 1 of Jæger. She was one of those

who insisted that the test lines were all of uniform color, but she suffered with more or less constant headache. Under homatropia horizontal lines seemed a little shady but not markedly so. Still she preferred a + 0.25 c. ax. 0.° to a + 0.25 s. in brightening up the entire face of the card. When the effects of the mydriatic had passed off, although the lines had again resumed their uniform brightness she found relief in a — 0.25 c. ax. 90° rather than + 0.25 c. ax. 0°. She was ordered the weak concave cylinder for constant wear. Before two weeks had passed by she could read for hours, night or day, with no discomfort whatever. Her headache returned whenever, for experiment sake, she would put off her weak cylinder glasses, even for a short time. The relief from suffering was positive and permanent. I had a visit from the young lady one year after I had first seen and adjusted glasses for her. She still wore the weak cylinders and had had no trouble whatever. She had resumed her education, and as a diligent student was making up for lost time.

The necessity for recognizing the lesser degrees of astigmatism forces itself upon me daily. Long continued and persistent headache with eyes paining on use, uninfluenced by rest, medication, or hygienic influences, and relieved at once by a 0.25 D. c. ought to be proof enough of the necessity for discovering these low degrees of deviation from the true corneal curves. In many sensitive persons the verification of the diagnosis and the advantages of the treatment to the comfort of the individual are conspicuously shown when the cylinders are suddenly reversed. Pain and head discomfort seem immediately brought on by the malposition of the axis of the lens. Then the restful condition when the cylinder is placed at the proper angle in the trial frame.

This 0.25 c. not only makes good vision easy, but often will make faulty vision good. All eyes needing a 0.25 c. have not necessarily $^{20}/_{XX}$ V. Some exhibit only V. $^{20}/_{XL}$, and yet this weak cylinder will enable them to see clearly the 20 lines at 20 feet. This is curiously shown in eyes of the same individual which differ in visual acuteness; one eye may measure

$^{20}/_{30}$ and the other only $^{20}/_{40}$, and yet each is made $^{20}/_{xx}$ by the 0.25 cylinder. In another series of cases one eye will exhibit $^{20}/_{xx}$ with all lines sharp, the other $^{20}/_{xxx}$ with one series of lines more distinct. The 0.25 c. will bring the dull eye sharply up to the normal, and the same glass will brighten up the whole picture when placed before the eye which without homatropia indicated no astigmatism. Should the cylinders be reversed, however, in the good eye, irregularity in the blackness of the lines would at once show itself, in evidence that the small degree of fault was being concealed in the eye muscles. It would come out, in spite of muscular effort to the contrary, when the fault was doubled by the wrong position of the cylinder.

I daily see persons who, in giving their history, can fix the time from which their head and eye discomforts started. Up to a certain period they had used their eyes with comfort. Then came a sudden demand for closer application and with it the trouble commenced. As the astigmatism is usually a congenital fault it must always have existed, therefore, notwithstanding the astigmatism, the eyes had been comfortably used in moderation. We also often find that when some extra work had increased the eye strain and made the head ache, the rest given by the temporary wearing of a cylinder would in time enable the astigmatic eye to do without the spectacle provided no unusual eye effort be again made. With young ladies it is no uncommon occurrence to find cylinders discarded at the end of school life, at least by those with whom the demands of society allow no time for close eye work.

We consider the shape of the eyeball as much a feature to be inherited as the shape of the ear, nose, or mouth, with this important difference, that whether the nose is pointed or stumped we can smell with it equally well, but should any deviation occur from the typical shape of the eyeball interference with vision is the consequence. These deviations in the eye shape are the rule. A perfectly formed eye in these days is as much an exception to the typical shape as a beautiful face is to the average citizen. Hence it is that I find astigmatism extremely common. With those who must apply themselves

to close work, it is the common cause of head discomforts, which can only be relieved by rest, and this class can not afford it, or by the wearing of cylinders, which is now within the reach of everyone.

We often find a patient prompt in accepting or rejecting one of two cylinders that differ in strength a 0.25 D. There are some ophthalmic surgeons who will permit an eye to vary from a 0.5 to 0.7 and know that they are giving an immense degree of comfort to their patients by recognizing this difference. These very surgeons repudiate the ability of an eye to determine between a 0.5 and 0.25. The eye accepts the 0.25 c. but the ophthalmic surgeons have drawn the line of the 0.5 c., and avow they will never prescribe a glass that is weaker. The result is that some one else will have to do it. I find myself applied to by persons coming from other specialties with the 0.5 D. c. with head discomforts unrelieved, who secure freedom from headache and the ability to use their eyes with comfort when the cylinder has been reduced to 0.25. I so often find the use of a 0.25 D. c. making the difference to the wearer of from not being able to read a few minutes without headaches to reading for hours with no headache, that I expect to secure these good results in prescribing them.

Another very common experience with me is that persons who suffer with persistent headache and hardly remember the day that they have been free from it, secure relief from the day that the 0.25 D. c. was first put on.

In the last four years I have been using the 0.25 D. c. more and more frequently. To give some idea of the number of 0.25 D. c., which I prescribed I find that last year alone I gave them to over three hundred private patients and in hospital practice to fully as many more, so that in one year over six hundred pairs of 0.25 c. have been prescribed through myself alone. The uninitiated would say that in many of these cases the glasses must have amounted to nothing. That suggestion is promptly met by this counter-statement, all of these persons, mostly young students, book-keepers or sewing girls, suffered more or less severely with headache and eye pains on

eye use, and they had applied for spherical treatment with the hope of getting rid of their annoyances. As with them all close application was a necessity they all suffered from their daily work. In all of these a small degree of astigmatism was found, which a 0.25 D. c. completely corrected. The fault was most frequently in the horizontal meridian, next in frequency in the vertical, and least frequently in the oblique diameters of the cornea. As a rule the annoyances were greatest when the faulty corneal curvatures were obliquely placed. The 0.25 c. gave the relief sought in by far the majority of these cases. In many of these persons whose history could be traced perfect relief continued with the use of these weak cylinders.

I have formulated for myself in office work this order: When a young person with no eye congestion has $^{20}/_{xx}$ vision and reads readily No. 1 of the test type, complains of pain in eyes and head on use, so convinced am I that astigmatism is at the bottom of the trouble that I seek it at once in the very beginning of the eye examination. If it had not been found by others it is not because it did not exist, but because it had not been diligently sought. That a great many of these patients would exhibit heterophoria from the fixed standard of muscular strength, I am quite convinced. I find in by far the majority of cases with the correction of the astigmatism all evidence of muscle strain pass off, and in such patients the heterophoria does not call for recognition because it no longer annoys when the cylinders are worn.

The least degrees of astigmatism cause in the world the greatest amount of head and eye discomfort, and the 0.25 c. will correct this refractive error and relieve head and eye pains. I not only therefore say that the weak cylinder ought to be prescribed, but that the ophthalmic surgeon is remiss who does not seek, find and correct those small but annoying errors in corneal curvature.

SOLID MIXTURES OF HOMATROPINE AND COCAINE AS A SUBSTITUTE FOR ATROPINE AND DUBOISINE IN DETERMINING REFRACTIVE ERRORS.

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With the discomforts and drawbacks attendant upon the use of atropine employed for the determination of refractive errors the profession is entirely familiar. The laity, too, are becoming more and more impatient of the ten days to two weeks partial blindness which often follows the instillation of atropine solutions when used for the purpose of prescribing glasses. Every oculist knows that many persons refuse to allow "drops" to be put into their eyes mainly on account of the enforced absence from work which their use commonly entails. As long as atropine is employed for the treatment of diseases that have already rendered the eyes unfit for work, no complaint is raised, but the employment of a drug that dilates the pupil, blurs the sight for distant vision and makes near work out of the question is extremely distasteful. More than that, there is a large percentage of the ametropic population urgently needing glasses who can not or will not spare the necessary time from business pursuits and an almost equal number who cannot *be* spared, however willing they may themselves be to go through a "course" of atropine. These individuals have to choose between submitting to an incomplete and perfunctory examination of the optician and jewelry-store order and allowing their refractive errors to go uncorrected.

I have devoted some months of the past year to experimenting with mixtures of homatropine (alkaloid, Merck) with cocaine (alkaloid, Merck) and I hope to be able to show, in confirmation of Lang and Berrett's statements that when used in a certain definite manner and dose and with proper excipients, this combination is a thoroughly reliable cycloplegic and quite as satisfactory as atropine for determining the refractive state of ametropic eyes. Furthermore, the employment of this mixture is not followed by the annoying symptoms incident to the employment of atropine, duboisine, or hyoscine. It accomplishes its purpose within an hour after being introduced into the conjunctival sac and the ciliary paralysis passes off, or may be made to pass off, within twelve or at most twenty-four hours.

Shortly after the discovery of homatropine by Ladenburg* of Kiel, some observers, Schell[2], Poutynski[3] et al., experimented with it and as a result of these trials entertained the belief that it would be found to act generally as a substitute for atropine. We now know that this is only partially true, and that homatropine while it possesses properties of value to the oculist, acts in many respects quite differently from atropia. Poutynski, for instance, was wrong in thinking that since the mydriatic and cyclopegic action of homatropine is a transient one that its irritant effects upon the uveal tract are insignificant and that it can be used to advantage where stronger mydriatics, such as atropine, are contraindicated. Stewart** and Jackson[4] have both drawn attention to the special irritant action exerted upon the deep structures of the eye by repeated applications of a watery solution of hydrobromate of homatropine and the former thinks this is one reason why ametropia cannot be properly estimated by its use. That the employment of homatropine hydrobromate, when used in aqueous solution, is unequal to the task of conquering the ciliary muscle has been abundantly proved by the observations and

*Berichte über die Deutsche Chem. Gesellschaft, Jan. 26, 1880.

**Phila. Medical News, March 3, 1886.

experiments of Dabney*, Holt[5], Oliver[6] and others, notwithstanding the experience of Risley[7] (with Randall) and Jackson[4]. Lang and Barrett, in their classical essay, have also shown the insufficiency of the pure alkaloid even employed in the more effective castor oil menstruum. I have myself frequently had occasion to entertain the same doubts that Holt expresses in his paper as to the value of solutions in water of homatropine and its salt (however strong the solution and however frequent the instillations) for examining the usual run of cases requiring glasses. I have, for example, carefully followed Jackson's instructions, with a 2% aqueous solution of Merck's homatropine instilled every ten minutes for an hour, and at the end of that time have found patients still possessing some accommodative power. Watery solutions of this, as well as of most drugs, on the other hand, easily flow off through the canaliculi, and for all pactical purposes are lost. This will account for the necessity, which Jackson insists upon, of frequent and continued instillations if one wishes to get satisfactory results from aqueous homatropine solutions.

More than one drop of fluid is not retained within the average sac-space. This one drop, in the case of the homatropine solution, acts as a stimulant to the lacrymal gland, and its secretion being added to the fluid already present, not only dilutes the latter, but also induces an overflow into the nose. From observations made upon patients during this investigation, I think I am within the truth in asserting that less than 10% of aqueous solutions of homatropine (or for that matter of most other drugs) is retained for any effective period within the conjunctival sac.

But there is another reason why in using homatropine there should be a *continuous* absorption of the drug. Its action upon the iris and ciliary muscle is cumulative up to a certain point and it is only by taking advantage of this cumulative property that we can hope to overcome the ciliary activity. In this important particular it differs from the fiercer action of

*Medical Record, Sept., 15, 1888.

duboisia and atropia, a single drop of a 2% solution of either alkaloid being sufficient to bring about a marked and lasting ciliary paresis. Tansley has sought to prevent these unpleasant effects and this waste of material by an ingenious little instrument, called a canaliculus compressor. I have no doubt it is an effective expedient, but think it would not be tolerated by many patients.

The effect of homatropine upon the accommodation is more lasting and more thorough when oleaginous menstrua and fatty excitents are employed for its application to the eye. This increased activity is, I feel convinced, entirely due to the fact that, as Green* asserts, the drug, when so exhibited, is retained within the conjunctival sac until absorption is complete. In Lang and Barrett's experiments it was found that from one drop of a 2% solution of the alkaloid in castor oil the fullest mydriatic and cyclopegic effects were obtained in about sixty minutes after its instillation. This thick, fatty menstruum does not pass off through the puncta, like water, but diffuses itself over the whole conjunctival and corneal surfaces until all the homatropine, with which it is charged, is absorbed. Moreover, since the pure alkaloid is less soluble in albumino-saline solutions—like the lacrymal fluid—than are its salts, the former is to be preferred, since the cyclopegic action is thus distributed over a longer period. All those who have used atropia with vaseline, lanoline, etc., will appreciate the difference in effect upon the ciliary body and nasopharynx between these mixtures and watery solutions of equal strength.

That cocaine and all its salts employed alone exert an evanescent influence upon the accommodation is well-known. As Nettleship* has shown that (if applied persistently every few minntes for an hour) a very decided degree of cyclopegia is brought about, which begins to disappear in fifteen minutes after the last application, and the muscle regains full control in another three-quarters of an hour. In conjunction with homatropine, however, the paralyzing effects of each drug are decidedly increased. So far as I can learn, we are entirely in-

*Trans. Am. Oph. Socy., 1875, p. 355.

debted to the experiments of Lang and Barrett, just referred to, for a demonstration of this truth. These observers employed a 2% solution in castor oil of the alkaloids homatropine and cocaine, and the results obtained are from a single application of this mixture. The following extracts from their tables will serve to illustrate the contention:

AVERAGE ACTION OF HOMATROPINE AND HOMATROPINE + COCAINE.

		Dilatation of Pupil.	*Recession of Near Point.*	*Recession of Far Point.*	*Diminution of Range of Accommodation.*
Time of Commencement, -	Hom.	13.33	6.67	—	5.
Of Action, - - -	Hom. and Cocaine.	10.	6.67	—	5.83
(In Minutes), - - -					
Time of Maximum, - -	Hom.	60.	61.67	63.33	65.
Action, - - - -	Hom. and Cocaine.	30.	61.67	77.	59.17
(In Minutes), - - -					
Time of Cessation, - -	Hom.	21.67	8.75	—	8.75
Of Action, - - -	Hom. and Cocaine.	48	25.67	—	25.67
(In Hours). - - -					

It will thus be seen that homatropine + cocaine dilates the pupil and paralyzes the accomodation more rapidly than homatropine alone, and that these results are more lasting and more decided than those following the employment of the latter.

It is a matter of speculation how cocaine increases, as it is now known to do, the cyclopegic and iridoplegic effects of all the other mydriatics. Jourevitsch and Maklakoff* both agree that cocaine favors the absorption of other drugs, the latter calling it the "multiplicator" of atropine and eserine.

Of course the greater effect of mixtures over members of a combination given singly is not a new observation in therapeutics. Witness, for example, the greater diuretic influence of the bromine and sodic salicylate compounds over the same amount of either of these agents given alone; or Brown-Sequard's** discovery that a given dose of the mixed bromides (KBr and NH_4Br) exert a greater sedative influence than the same quantity of either drug. My own notion is that cocaine renders the outer epithelial layer of the cornea (and conjunctiva) more pervious to the homatropine or the other drug. It certainly makes it more liable to abrasion, as every one knows, and if a thoroughly cocainized cornea be carefully examined with a Coddington lens, minute fissures will often be observed, running in all directions through the superficial epithelium. It is comprehensible that a similar effect is produced upon the conjunctival epithelium also, so that both miotics and mydriatics are quickly absorbed into the lymph spaces and capillaries and soon reach the interior of the eye.

Although I believe that the castor oil mixture of homatropine and cocaine, introduced by Lang and Barrett, is an efficient agent in determining refractive errors, there are, it seems to me, some objections to it. In the first place, an oily film forms upon the corneal surface which stands in the way of a distinct view of the fundus, and even interferes somewhat with vision. I think, also, that the same film makes it more difficult, than when the oily menstruum is not employed, to decide just when the shadow "turns" in the examination by retinoscopy. These effects are partially due to the difference in the refractive indices of the cornea and castor oil, and partly to

*Amer. Univ. Med. Sciences, vol. iv., 1889, p. 157.

**The Physiological and Therapeutical Action of the Bromides. Clark & Amory, p. 105.

the fact that the film is not always uniformly distributed over the corneal surface.

Thinking that the exhibition of solid homatropine and cocaine would best suit their peculiar cyclopegic action, I made a number of trials with these drugs, in the forms of discs, with various excipients. These, used alone and in combination, were chiefly boracic acid, dextrin, linseed jelly, gum acacia, marshmallow jelly, gum tragacanth and various kinds of gelatine. These experiments led me to select discs made from the latter as the best medium for exhibiting cocaine and homatropine, and I have had the most satisfactory results from them in single doses of gr. $^1/_{50}$ each. These discs or lamellæ were manufactured for me by Messrs. Wyeth & Bro., of Philadelphia, and in some respects are superior to the best French and English makes. They are absolutely non-irritant, and immediately become soft and pliable when placed upon the ocular conjunctiva. To this they readily attach themselves and remain *in situ* until they are entirely (and *slowly*) dissolved by the lachrymal secretion. The cost of these discs is also much less than homatropine solutions of the same strength (of which nine-tenths is probably wasted), used for determining refractive errors, because nearly all the drug is absorbed in a manner most likely to do effective work. In one disc there is exactly the same quantity of homatropine that is contained in one minim of a 3% solution, and I have calculated that in the lamellar form it is ten times more efficient than when dissolved in water.

The best results seem to follow the observance of these rules:

1. Having dampened a small camel-hair brush, touch it with a disc, previously placed on a piece of clean, dry paper, when the disc will readily stick to the brush. Telling the patient to look up, draw down the lower lid, and place the opposite surface of the lamilla against the closed scleral conjunctiva, toward the outer canthus. It at once adheres to the former, and the patient is now told to close the eye.

2. The patient must keep his eyes shut until the examina-

tion is made. This precaution is taken to lessen the danger of an abraded cornea, and to avoid the disagreeable and annoying dessication of the corneal epithelium, which sometimes follows the introduction of cocaine into the conjunctival sac. The moisture upon the lids prevents all this.

3. The examination must begin not earlier than sixty and not later than ninety minutes after the introduction of the discs, so as to take advantage of the period of maximum cyclopegia.

4. In persons under 25, or where there is reason to suspect accommodative spasm, I supplement the single disc by another, inserted fifteen or twenty minutes after the first.

5. I always warn the patient that there will be a little smarting after the introduction of each disc. This, due chiefly to the cocaine, passes off within a few minutes.

6. Following Lang and Barrett's experiments, I frequently introduce, after the examination has been completed, a Wyeth eserine disc (gr. $^1/_{1000}$), or a single drop of the castor oil solution ($^1/_{10}$ %) of eserine. In most cases this is sufficient to make it possible to do effective work within twelve hours, and in all instances within twenty-four hours. To avoid encroachment upon business time, I frequently use the lamellæ in the afternoon, and, by inserting a single eserine disc after the completion of the examination, the patient is enabled to resume near work the next morning. In cases where this is not possible, I direct him to return for a second application. The great advantage of this procedure over atropine, duboisine and hyoscine, in the case of business men and women, is apparent.

7. Both cocaine and homatropine are to some degree hydroscopic; discs prepared with these drugs should, therefore, always be kept in an air-tight receptacle.

I append short reports of a few cases, chosen from a large number, into whose eyes (after the refraction has been determined by means of discs containing gr. $^1/_{50}$ each of cocaine and homatropine, employed in the above mentioned manner), a 1% aqueous solution of atropine had been instilled three times daily for three days and longer. In some instances the

degree of myopia or hypermetropia developed by the atropine was a shade higher than from the use of the discs; sometimes it was slightly less. Occasionally, there was a slight variation in the axis of the cylinder accepted by the patient. On the whole, however, the differences were not greater than those which one would expect in observations made under similar conditions by different oculists. In a number of instances the position of the near point was noted by the Landolt optometer and convex glasses at the moment of greatest cyclopegia from the discs; it did not vary from that established later on by atropine. The refraction was measured by means of the Javal Schiötz ophthalmometer and test lenses.

Case I. M. B., æt. 13. Occasional convergent squint for four or five years. Asthenopia after half an hour at school-work. R. E. V. with $+5$ D$=^{20}/_{LXX}$. L. E. with sph. $+5$ D⌒cyl. $+1$ D ax. $90°=^{20}/_{XX}$. Examined subsequently by Dr. Stevenson, under atropine, with same results.

Case II. C. F., æt. 18. Headaches and other asthenopic symptoms. R. E. with $+4.50$⌒cyl. $+1$ ax. vert.$=^{20}/_{XX}$—. L. E. with 4.50 D⌒cyl. $+0.75$ ax. vert.$=^{20}/_{XX}$. Dr. S. reports same results from atropine R. E., but in L. E., $+4$ D ⌒ $+1$ D. ax. vert.$=^{20}/_{XX}+$.

Case III. A. F., æt. 16, seamstress. Supraorbital headache, etc. L. E., $+2.50$ ⌒cyl. $+1$ D., ax.$90°=^{20}/_{L}$. R. E., $+1.25$ ⌒ cyl. $+1.25$, ax. $90°=^{20}/_{XX}$—. Atropine 3 days. Dr. S. reports same result.

Case IV. Miss S., decidedly asthenopic symptoms after reading or other near work. Dr. S and I found the same refractive error in both eyes, I after the use of four lamellæ in 90 minutes, and he, subsequent to four days' institution of atropine: R. and L. sph. $+3.50$ ⌒cyl. $+3.50$, ax. $85°=^{20}/_{XL}$.

Case V. W. T., æt. 16. Has had a blepharo-conjunctivitis nearly whole life. Disc in each eye at 3 P.M.; another at 3:20. Examination at 4:15. R. E. with—0.50⌒cyl. —0.75 ax. $130°$ $=^{6}/_{VI}+$. L. E. with—0.25 $=^{6}/_{VI}+$. No change after atropine.

Case VII. E. K., æt. 13. No ocular symptoms. After discs R. and L. E. with$+0.50=^{6}/_{VI}+$. Dr. Stevenson's report

after three days' atropine: "R. E.=$^{20}/_{XVI}$ with+0.25. L. E. the same."

I have to thank Prof. Haines, of Rush Medical College, Dr. Stevenson, late House Surgeon of the Illinois Eye and Ear Infirmary, and Messrs. Wyeth & Bro., of Philadelphia, for their kind assistance during these investigations. In addition to those mentioned as foot notes, I am indebted for valuable information to the following instructive papers:

[1]Lang and Barrett. The Action of Myotics and Mydriatics. Oph. Hosp. Reports, vol. xi, pp. 130 and 219.

[2]Schell. A New Mydriatic. Phil. Med. Times, October, 1880. pp. 7 and 47.

[3]Pautynski. Pilocarpin and Homatropin. Klin. Monatsbl. f. Augenheilkunde, 1880, s. 343.

[4]Jackson. Homatropin Hydrobromate. Phil. Med. News, 1886, p. 88.

[5]Holt. The Inefficiency of Hydrobromate of Homatropin in Controlling Accommodation. Trans. Am. Oph. Society, 1889.

[6]Oliver. The Comparative Action of Hydrobromate of Homatropine and of Sulphate of Atropia upon the Iris and Ciliary Muscle. Am Journal Med. Sciences, July, 1881, p. 150.

[7]Risley and Randall. Value of Hydrobromate of Homatropin in Ophthalmic Practice. Trans. Am Oph. Society, 1881, p. 22.

[8]Nettleship. On Cocaine in Ophthalmic Practice. Trans. Oph. Society, United Kingdom. Vol v., p. 226.

SELECTIONS FROM AMERICAN MEDICAL JOURNALS.

CONSANGUINITY IN DISEASE—WITH PARTICULAR REFERENCE TO OCULAR AFFECTIONS.

BY JAMES A. LYDSTON, M.D., PH. G., DENVER, COL.

Fellow of the Chicago Academy of Medicine; Late Assistant Surgeon Illinois Eye and Ear Infirmary.

The subject of consanguinity is one that to my mind has not received the profound consideration at the hands of the medical fraternity that one of such vital importance to present and future generations merits, It is true that many have given the matter some thought, but it has been a question of here to-day and away to-morrow, and either through neglect or fear of courting the criticism of a few in the medical world, it has been apparently consigned to the oblivion of the past; but with your kind permission I shall endeavor to resuscitate the dying subject by presenting for your consideration the topic of consanguineous marriages; and their bearing upon disease in a manner which an experience and careful observation of some years best enables me to do. It is not without full recognition of the fact that I trespass upon fields as yet unadorned by full verdure—in fact it is with this very object in view, having been rendered bold by the meagerness of our knowledge upon this all-important topic, that I invite attention to the following scientific facts, concluding with data which my own experience furnishes.

To begin with: What diseases are said to be directly or remotely dependent upon consanguineous marriages? To my

mind there are few diseases at present known to medicine that may be exempted from the category, but for convenience sake we will confine ourselves to a few of the following well-known factions, viz: Idiocy, epilepsy, insanity, hydrocephalus, albinism, and diseases of the eye—the last of which was the first to call my attention to the subject of my paper, and to stimulate me to a close scrutiny of the many cases falling under my care, and that of my brother physicians. Huth, who has written a most exhaustive treatise on the marriage of near kin, prefaces his statements by the remark that he has "divested himself of all prejudices in the consideration of the subject," and takes the stand that disease is not found to any greater extent in the offspring of related couples than it is among those who are not so related, and one of the strongest arguments against the possibility of disease as a sequel in the event of such marriages, is the fact that in-and-in breeding among animals is practised to such a great extent without evil consequences, and in referring to this subject, says: "Although by in-and-in breeding man may be able to do a great deal in the way of alteration, he must still follow nature; he cannot go contrary to physiological laws. He can increase the qualities which he wishes to get only at the expense of qualities which he is content to go without, and can no more obtain an animal all fat than he can teach his breed to live without food." Continuing, he says: "We must remember that ill-directed breeding is as bad when there are frequent crosses as when there are none; that it is the selection that is the great improver when properly directed, and that breeding in-and-in is only advantageous because it fixes the breed and obviates the necessity of crossing from an unimproved breed." So that he tacitly admits that it is not a wise procedure, and we are aware that monstrosities are sufficiently frequent among the lower animals to excite suspicion as to the wisdom of the practice from a strictly biological standpoint.

Mr. Darwin says, touching on this point: "Nearly one-third of our race-horses have proved barren, or have slipped their foals"—a fact which he attributes to their high nurture or

close interbreeding. It is said that Nanthusius imported a gravid sow from England and bred closely in-an-in from the progeny for three generations, and with bad results; yet he esteemed one of the latest sows a good animal, and she bred well with a boar of different blood.

What are Mr. Darwin's conclusions in regard to this matter? He concludes that "on the whole in-and-in breeding does not affect, necessarily, the external form, while it does affect the general constitution, mental powers, and especially the reproductive powers, and states in his "Descent of Man," that "when the principles of breeding and of inheritance are better understood, we shall not hear ignorant members of our legislature rejecting with scorn a plan for ascertaining by an easy method whether or not consanguineous marriages are injurious to man."

It is true that this promiscuous intermarriage of near kin was followed to extremes by the Greeks, Egyptians, Assyrians and many of the barbarian tribes that figure so prominently in ancient history, and it is asserted with no marked evil results. But let us look at and study the table of the dynasty of the Ptolemies, and see what is portrayed thereby. No one will deny that the Egyptians decayed in wealth, intellect and power almost from the accession of the Ptolemies. Why? Certain authorities claim that their downfall was not due to their consanguineous marriages. To what, then, are we to ascribe their speedy annihilation? Are we to accept the bare assertion that it was not consequent upon the promiscuous marriages of near kin as an established and indisputable fact? It would appear not, but that we should, as scientists, probe the matter to its very core, amassing an overwhelming number of striking examples of the injurious effects of marriages among related couples, so that doubt may no longer exist in the mind of any thinking, reasoning human creature in regard to a subject of such vast importance to the future welfare of the human race. The "Arabian Knights" are teeming with instances of marriages between first cousins, and if we can believe any part of the same as suggested by observation, the disastrous

effects which followed such unions are enough in themselves to cause people of to-day to pause and consider ere they make the all-important step.

Indians never marry within their own family, but consider that marriage with strangers improves their offspring. Mantegazza says: "In the Argentine Republic consanguineous marriages are frequent with all their unhappy consequences!" Consanguineous marriages are more frequent among the Jews than among the Christians, and as a consequence we find insanity and idiocy to be more common among the Jews. Deaf-mutism is also more frequent among the Jews. We are aware that any disease such as syphilis, or other marked habits or other idiosyncrasies of parents, tending to weaken them are apt to cause an arrest of mental development in the offspring, and I argue that the mere fact of the marriage of near kin, their dispositions, hereditary tendencies and mental developments being necessarily closely allied, it is reasonable to infer that their children—if, indeed, they have any—will manifest defects in their mental organizations, physical contour and anatomical structures. The greatest difficulty with which we meet in these instances is to eliminate all other predisposing factors of disease, such as syphilis, alcoholism, etc., for we are certainly not at liberty to assume that consanguinity is the cause of the pathological manifestations except in those cases in which there is absolutely no other accountable reason to which the defect in question can be ascribed.

The question naturally arises: Are there any such instances? I hold that there are, having been convinced by numerous typical cases in my own practice in which I was able to gain a lucid history of the patient's parents, and without exception both the remote and intermediate history bore out the conclusion which I suspected before my inquiries were made, that the patient afforded a typical example of disease in the offspring of consanguineous parents. Dr. Bemiss, who has investigated the subject of idiocy in its relations to consanguinity, asserts that 15% of the idiots in our United States' Asylums are of consanguineous origin. Deaf-mutism is also shown to be consequent upon consanguinity.

In France MM. Boudin, Devay and Chipault have substantiated the theory by careful investigation. Wagner says in his general pathology in the chapter on inheritance: "Inasmuch as male and female fluids combine for the formation of the germ, the embryo may be constructed in its various parts after the fashion of one or the other parent; insomuch as it resembles the father it is less like the mother, and *vice versa*, so that by a preponderance of one side the influence of the other may be counteracted. * * * The mingling of stock is a means of preventing the degeneration of succeeding generations, while it is well known tnat the intermarriage of relatives tends to develop family traits and diseases to an extreme degree. It is especially known that in the case of cretinism and idiocy the marriage of related persons favors their appearance, while it is prevented by marriage among persons of different races and countries." The same, he says, "is true in a lesser degree of deaf-mutism, and other remarkable facts are the frequency of sterility in related couples, and the uncommon mortality of the children of such parents."

Dr. Morris, of New York, published the following table, which, as it illustrates in an admirable manner the influence of consanguinity in disease, I will introduce at this point:

Relationship	Families.	No. of Children.	Perfect Children.	Imperfect Children.	Percentage.
Third cousins	13	71	42	29	40.8
Second cousins	120	626	360	266	42.5
First cousins	630	2,892	955	1,936	66.9
Cousins' offspring of cousins	61	187	63	123	65.7
Uncle and aunt with niece and nephew	12	52	10	43	81.0
Double cousins	27	154	21	133	86.3
ncestuous	10	31	1	30	96.7

In conclusion, I will cite the following cases, occurring in my own practice, which present to my mind irrefutable proof of the pernicious effects of consanguinity in disease.

Case 1.—Three children in one family, parents first cousins, aged respectively, 3, 5 and 7 years. Ophthalmoscopic examination revealed in each case retinitis pigmentosa, the peripheral fields in each instance abolished, while central visual acuity was noticeably impaired in one case. Leber cites cases extending through six generations.

Case 2.—Case of microphthalmus right eye; parents second cousins.

Case 3.—Congenital aphakia, both lenses absent, child nine months; parents first cousins.

Case 4.—Typical albinism in two children of same family, with congenitally displaced lenses, tremulous irides, etc; parents first cousins.

Case 5.—Double aniridy in child, 3 years of age; parents first cousins.

Case 6.—Case of sclerectasia posterior, with subsequent choroidal changes, passing into a sclerotico—choroiditis posterior, cnild, æt. 7 years; parents first cousins.

Case 7.—Coloboma iridis: child, aged 4 years; parents second cousins.

The above cases have been selected for the reason that they seem to present typical illustration of the sequelæ in the event of such marriages, and while many more might be added, it is believed that they are all-sufficient.—*West. Med. Reporter.*

A QUARTER OF A CENTURY DEVOTED TO PERFECTING THE EXTRACTION OF CATARACT.

Clinical Lecture by PROF. L. DE WECKER, Paris, France.

Translated from *Le Progres Medical* by JOHN FORD BARBOUR, M.A., M.D.

GENTLEMEN.—I am happy to see among my auditors Professor Knapp, who, like myself, during the last twenty-five years has devoted special attention to patients affected with cataract, endeavoring to apply to their benefit the marvelous progress in ocular surgery. It is exactly twenty-five years since von Graefe published an account of his new operation of extraction, which still bears the name of von Graefe's operation, although it has undergone the most radical modifications. This operation made general the combination of iridectomy with extraction, and succeeded in bringing about an abandonment of simple extraction for a considerable period of time.

At present, in most statistical tables, procedures are designated as von Graefe's operation, which differ much more from the primitive method of the master than simple extraction differs from the operation of Daviel, whose name, however, is never mentioned. Modifications of the original operation of von Graefe were all the easier since his description of the procedure was somewhat inexact. Von Graefe accompanied this description with a diagram. He says: "The point A (the puncture) should be made in general at one-half a line from the corneal limit and two thirds of a line below the tangent to the summit of the cornea. With such a puncture and

a symmetrical counter-puncture at B, a wound is made, having a length of four and a half to four and three-fourth lines."

This buttonhole section, situated almost entirely in the opaque pericorneal tissue, underwent rapid modifications, affecting principally its peripheral situation as well as the breadth of the flap, which originally did not exceed a line and a half or two lines. Thus modified the operation of von Graefe became so general that the few adherents of simple extraction with large flap, such as Hasner, were considered behind the times by the new generation.

The first attempt to return to the old procedure was made by Liebreich in 1871, who abandoned iridectomy and made a section below through the entire cornea, which was revived seven years after by changing it to the horizontal diameter.

But Liebreich's section again encroached upon the non-transparent position of the cornea and presented all the inconveniences of very slightly elevated flaps, as Lebrun pointed out in 1872, requiring the wound to be half opened to admit of easy egress for the lens. To Lebrun should always be ascribed the merit of being the first to renounce the encroachment upon the sclerotic, which we consider a vice of operation.

Ten years after the appearance of von Graefe's operation, I entered the field in favor of a section borrowed from the old flap operations, numerous statistics of which I presented to the Congress at Heidelberg. Thus fifteen years ago, I attempted to unite the advantages of simple extraction, which exposes one to capsular retentions, to peripheral imprisonments of the iris and to migratory ophthalmia.

Was this a complete return to the teachings of Arlt, Sichel and Desmarres, who cut loose nearly one-half of the cornea, beginning one millimeter above the corneal diameter? No; for we consider such a flap too large, and that the operation may be improved by reducing its size and also by the employment of the fixation forceps and the retractor, two instruments which have had the most potent influence in furthering combined linear operations.

I showed, in presenting my operation to the Academy of

Sciences in 1875, that it is sufficient to detach one-third of the cornea instead of one-half (or nearly one-half), as was the usual custom before the introduction of linear extraction.

I did wrong to say *one-third of the cornea*, for in indicating one-third of the diameter as the breadth of my flap, that is to say, four millimeters (in a cornea twelve millimeters in diameter), this expression, *one-third of the cornea*, has given rise to confusion and a desire to modify the operation anew. The reduction of the section from the half to the third might appear too great, and in order to choose an intermediate figure between the half and the third, it has been proposed to take the *two-fifths*.

But there is evidently a misunderstanding here, and if I consider a flap having a breadth of *one third of the diameter* of the cornea as one-third of the cornea, I by no means stated that a versed sine of four millimeters corresponds to an arc equivelent to *one-third of the circumference*, knowing well that in a circle it is the fourth, and not the third, of the diameter which represents the versed sine of an arc equal to one-third of the circumference. When I stated (*Traité Complet*, T. II, page 1013) that the detachment of the two-fifths of the cornea was an indefinite expression, I thought that it was proposed to measure the two-fifths upon the diameter of the cornea (which is far from easy to do in case of a straight line with a compass) and not upon the circumference, which is well nigh impracticable, as any one may convince himself by endeavoring to find upon the dial of the watch the arc corresponding to twenty-four minutes, that is, to two-fifths of the dial, without being guided by the figures. It may be responded to this that not only Critchett and Bowman, but I myself also, have chosen the *third of the circumference* for certain extractions and that this delimitation presents the same inconveniences, since guide points are as necessary in ocular as in general surgery.

But as concerns our English confrères, they make use of lancet-shaped knives, which guide them after penetration of the cornea, this measurement being facilitated by the employment of a lance adapted to the dimensions of the cornea, and

which, when it has penetrated to the bottom of the anterior chamber, allows of the construction of an equilateral triangle with its sides and the corneal section, thus indicating the division of the circumference of the cornea into three equal parts.

When; as is our custom, the straight knife is used, nothing is easier than to make a section of one-third of the circumference; it suffices for this to take the half of the upper vertical radius or one-fourth of the diameter. But where shall we find guide points for the two-fifths of the circumference? The two-fifths do not correspond to any exact fraction of the vertical diameter. It corresponds to a fraction which exceeds the third by a little more than a tenth of a millimeter (the third of the diameter being four millimeters, the versed sine of the two-fifths is 4.145 millimeters).

If the horizontal diameter is taken as a guide, one cannot any longer, as we do, make the incision exactly two millimeters above. It becomes necessary to measure off 1.855 millimeters above the horizontal diameter in order to get the two-fifths of the circumference. This, then, is entirely an approximation.

It is assuredly more practical to take as a measure a definite quantity represented by the third of the diameter, than "to oscillate, as Professor Panas proposes, between the third and the two-fifths of the circumference." For, as I have already shown elsewhere (Manual, p. 539), the difference between my flap and that of M. Panas' is entirely insignificant. The former comprises an arc of 141° 3′; the latter corresponds to an arc of 144°—the difference amounts to nothing.

The question of the precise size of the flap has its importance, for it is necessary in returning to the old flap neither to adopt excessive dimensions nor to loose the advantages gained since the linear extractions have been in vogue.

We ought to abandon neither the great security of the operation nor the great security of the patient. If it is desired to obtain coaptation, a more rapid cure with less prolapsus of the iris, it is necessary to determine upon an exact delimitation of the dimensions of the flap, which I believe that

I have determined definitely by choosing the third of the diameter, that is, a maximum of four millimeters in breadth.

This figure should be maintained; one should neither go beyond it nor come under it. And as I believe that such a flap has no tendency either to prolapse spontaneously or to coapt less well than sections of less breadth, I have renounced completely, even for combined extractions, the flap three millimeters in breadth, that is, a section of a *third* of the circumference.

The objection which has been urged against my section that it is insufficient for certain very large cataracts (very dark or black cataracts) is, to a certain extent, justifiable, since I have endeavored to remedy this by changing the situation of my section in order to facilitate the egress of these large cataracts, or in order to prevent the breaking up of certain very hard cataracts, the border of which chips, unless they slip very easily through the section.

By taking for the base of my flap exactly the horizontal diameter of the cornea and by giving it a breadth of four millimeters, I get the easiest possible passage for the entire cataract, however large it may be. This flap, with a base of twelve millimeters, does not prolapse spontaneously nor slip from the action of the movements of the pupils, and gives, too, with a very large opening, an excellent coaptation of the wound.

After twenty-five years of investigations, during which we have performed thousands of extractions, we have now aimed at a result which does not seem to differ materially from that which our masters, Arlt, Sichel and Desmarres, taught us. However, we have demonstrated, and I trust in an irrifutable manner, that it is never proper to make a flap more or less than four millimeters in breadth, and that one should never leave the transparent tissue of the cornea in making a section. For, if we do not have to deplore the occurrence of suppuration in 10% of cases, as did our masters in spite of their wonderful abilities, these suppurations have been made to disappear almost entirely. This is not exclusively due to the rigor-

ous antisepsis which we now observe. Before the employment of antiseptics, von Graefe had succeeded, with a wound which coapted much better than in the old sections, in reducing the cases of suppuration to 5%, and it is only the last 5% that antisepsis has eliminated.

It is then indispensable to conserve all the advantages of an exact coaptation, which is one of the chief results of von Graefe's labors.

The last five lusters have given us local anæsthesia by cocaine, which permits a facility of execution of which our predecessors never dreamed, and which enables us to attain to a truly ideal operation in favorable cases without the necessity of recurring to the perilous extraction of the lens with its capsule.

Thus it is possible at present to strip off the matrix of the lens, the anterior capsule, to expel by lavage, after the egress of the nucleus, all the cortical masses, to prevent prolapse of the iris or even its entire imprisonment in the cicatrix by a simple instillation or by the introduction of eserine into the anterior chamber along with the solution used for lavage.

If we take the statistics of our predecessors, out of one hundred patients, ten lost their eyes from suppuration, ten others from irido-choroiditis, hæmorrhage, etc. At present, suppuration having become an insignificant factor, we still have ten other losses to cut down, which, even in the most favorable statistics, are reduced to 5 or 6%.

Apart from the great utility of antisepsis, the modifications of the operative technique, apparently so unimportant, have given the happiest results for the patients and the most satisfactory for the operator.

Here, then, patient and physician may felicitate themselves on having obtained the goal.—*Med. Progress.*

DOUBLE OPTIC NEURITIS OF MALARIAL ORIGIN[1].

BY FRANK W. RING, A.M., M.D., NEW YORK.

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[1]Read before the New York State Medical Society, Febuary 3, 1891.

January 12, 1888, Mrs. F. K. W., æt. 55, consulted Dr. C. W. Packard, of New York, on account of failing vision. The patient was referred to me. She complained of a blur in the upper field. Upon examination I found moderate peripheric impairment of the field in the left eye. Right vision=$^{20}/_{XV}$ with+.75. Left vision, $^{20}/_{XX}$+with+1.0. Ophthalmoscopic examination negative.

January 13. The following morning the patient was led to my office by a daughter. R. V.=5 fingers; L. V.=perception of light. She had retired the preceding evening, seeing as well as when at my office in the morning, and awakened practically blind. Right field with candle, quick and good. Ophthalmoscope showed marked papillitis, œdema of the disc, evident infiltration in and near the optic nerve, veins slightly enlarged, no pulsation, arteries about normal, outline of disc somewhat obscure, slight tortuosity of veins, no retinal changes apparent. Approximate swelling of $3^1/_2$ dioptrics of nerve.

Thinking the case of unusual interest, I took the patient to Drs. Agnew and Webster. They corroborated my diagnosis and expressed surprise at the rapidity of loss of vision.

January 18. Perception of light in each eye. January 22. V.=nil.

January 30. Sixteen days from begining neuritis, complains of stiffness in knees. Has more or less difficulty in walking. When reclining, finds it impossible to turn over. The affection of the joints came on suddenly and in four days the patient could not rise from a chair without assistance. By being supported she could shuffle along the floor. On striking her quickly under the hip, the limb would fly up, and by this action she could ascend stairs. There was complete paraplegia, exaggerated reflex, ankle clonus. In fact, she lost all locomotive power of the lower extremities. The skin felt thick and numb. Bladder unaffected.

February 5. Patient for the first time in fourteen days has perception of light. Has enough control of her limbs to enable her to move about with the aid of a chair.

February 22. Vision improving. R. V=10 fingers. L. V. =5 fingers. Color perception lost as far as could be ascertained. Six days later can distinguish bright red. Field good, retinal vessels slightly diminished in size.

March 7, 1889, thirty-nine days from begining paraplegia, is able to walk. R. V.=$^{20}/_{CC}$; L. V=$^{4}/_{CC}$. Field good, color sense diminished. Nerves pale, otherwise the fundi are normal, with the exception of slight decrease in caliber of arteries.

April 7, 1889 R. V.=$^{20}/_{XL}$; L. V.=$^{20}/_{C}$. Color sense varies; calls red brown. Left nerve whiter than right.

April 17, 1886. Stiffness in knees entirely gone. Color perception impaired.

February 14, 1890, two years from initial papillitis, R. V= $^{20}/_{XV}$ with+.5; L. V.=$^{20}/_{XX}$+ with+5, which is a return to the original vision before the neuritis. Color sense decidedly impaired.

December 29, 1890, last examination and nearly three years from beginning neuritis, R. V.=$^{20}/_{XV}$ with+.75. L. V.=$^{20}/_{XX}$+ with+1.0. Ophthalmoscopical appearance: Right nerve bluish white, veins normal, arteries slightly diminished; no tortuosity; lamina cribrosa plainly visible. Left nerve bluish white, otherwise the fundus has a normal appearance. Color sense: pale yellow, green, or pink, looks drab; cannot distinguish

green from blue. Right eye—the field for yellow is much contracted. A little less for red, and less than normal for blue. Left eye—yellow visible in central vision only. Red, field tortuous in outline and very much diminished. Blue, contracted much less than in right, with a large scotoma in upper field. Field for white perfect in each.

The patient received a nutritious diet, iodide of potash, arsenic and strychnia.

During the entire illness, the patient was free from pain, slept well, appetite good, no nausea, no headache. The urine was examined several times, with negative results. No specific history. She has had eight children, all healthy, no miscarriages. Passed the climacteric at forty-two years. Mrs. W. has been a decidedly healthy woman, with one exception, and that exception is best expressed by the following extract from a letter written by Dr. Packard: "So far as I know, Mrs. W. has no specific taint. I have treated her during the past few years for several malarial attacks, accompanied with fever, characterized by periodicity, and that yielded to quinine. At such time she has suffered from gastralgia and enteralgia that I believed to have a malarial basis."

Resume.—An apparently healthy woman consults an oculist because of a slight blur in her vision. He finds both fundi normal, pupils slightly dilated and responsive to light. During the same night she becomes practically blind. The only apparent cause is a marked papillitis. This continues to be an idiopathic affection for sixteen days, then she has a paraplegia. The vision becomes totally lost. In fourteen days, upon a relaxation of the paraplegic symptoms, the sight gradually returns; and in two years is normal, with a decided defect in color vision.

Was the neuritis an idiopathic affection, or was it concomitant to the paraplegia, and what was the existing cause of both?

Optic neuritis is often accompanied with headache, nausea and vomiting; and it usually occurs from some intra-cranial disease, tumor or other adventitious product.

With tumor the progress is inclined to be slow and the prog-

nosis grave. To be brief, let us exclude tumor as a cause, also meningitis and sclerosis and Bright's disease for palpable reasons.

Retro-bulbar neuritis (von Græfe).—A condition in which we may have a sudden loss of vision. The pupil is usually widely dilated and not responsive to light. The disc becomes slightly elevated. Arteries small, veins tortuous.

"In retro-bulbar neuritis in the acute form, we have headache, orbital pain, increased by movement of the eye and pressure. Serous effusion of the optic disc and retina due to compression of retinal vessels." (Knapp.)

In Noyes' admirable treatise on the eye (1890) he describes a toxic retro-bulbar neuritis, where the atrophy succeeding the inflammation is due to a lesion of the axial fibers of the nerve, and cites a case of Uhthoff's, where he localizes the character of the lesion in color scotoma. If there is a retro-bulbar neuritis due to tobacco and alcohol poisoning, why may there not be a similar affection due to malarial poisoning?

There are certain affections due to the action of malarial poison upon the system. There is a *bacillus malariæ* particularly affecting the spleen. This bacillus has been found in the blood during the fever, causing marked changes in it.

Let us turn our attention to another cause of papillitis, denied by some, *i. e.*. distention of the sheath, or hydropsia of the optic nerve, which is a serous effusion into the optic sheath coming from the cerebral arachnoid space.

"A fluid effusion into the arachnoid space and increased intra-cranial pressure are always associated with an accumulation of fluid in the intra-vaginal sheath, which œdema will cause a swelling of the optic nerve." (Schwalbe.)

"The intra-cranial pressure must force the fluid from the arachnoid space along the sheath of the optic nerve into the canal-like system present in the lamina cribrosa, causing swelling and congestion of the disc." (Pagenstecher.)

Bull says, loss of vision from isolated papillitis alone is never sudden, and that distention of the sheath alone is not sufficient to produce papillitis, but may intensify it. Hughlings Jackson

is of the same opinion, and the latter also says there is nearly always a visible stage of neuritis before sight fails.

Macnamara, in his text-book of disease of the eye, cites a case precisely similar in many respects to the one in question. A girl, æt. 13, was attacked with intermittent fever, after which she had paralysis of the lower extremities, and a partial inability to move the right arm. Pupils dilated and insensible to light. Optic papillæ swollen and hazy, with serous effusion into the nerve and surrounding tissue. She became quite blind. Her recovery was gradual and perfect, both as to the paraplegia and vision. He remarks that this is an example of a class of cases not very uncommon in India, and depends upon malarial poison affecting alterations in the blood. He gave, as a direct cause, a serous effusion into the optic thalami and corpora striata. The pressure thus exerted on these nerve centres, interfering with the volition of the patient over the affected limbs, and the serous effusion or exudation into the papilla and pressure upon the optic nerve fibers, causing the loss of vision.

I offer this paper as a contribution to the literature on optic neuritis. I am aware there may be double optic neuritis, with and without loss of vision; also with gradual or sudden loss of vision. But, as a rule, there is a stage of neuritis visible before the blindness. Here the fundi were known to be normal a few hours before an almost total loss of sight.